

## ALL ELECTRIC VS OXY-FUEL GLASS MELTING

### SUMMARY

#### Background

Electricity will continue to play a significant role in the melting of glass, both as all-electric or by providing supplemental boosting. However these uses are subject to replacement by natural gas, which is viewed by the industry as a less expensive energy source. The acceptance of oxy-fuel melting technology will replace some all-electric melters, but the generation of oxygen for this application is a 24-hour per day, seven day per week process using electricity. In addition all-electric melting will continue to be used as it offers distinct advantages in some applications. Electrical energy use in glass manufacturing represents about 20 percent of the equivalent energy supplied by natural gas, and melting is the dominant use of energy in the glass industry.

In the mid 1980's, the glass industry began to adopt oxy-fuel melting technology encouraged by more stringent air pollution regulations and the ready availability of natural gas. Oxy-fuel melting is the use of injected oxygen as a substitute for combustion air; it can be partial oxygen assist but usually 100% of the oxygen required is supplied. Since 1990, the U.S. glass industry has increased the proportion of oxy-fuel furnaces from less than 1% to approximately 25%. During the same period all-electric furnaces dropped from 12% to 9%.

The highly competitive glass industry is very sensitive to operating costs. Of the total operating costs of the U.S. glass industry about 55 percent is for materials, 30 percent for labor, and 15 percent for energy (the majority of which is for melting).

This report describes the characteristics of oxy-fuel melting, particularly compared to all electric melting, so that prospective users and their electric suppliers can have a better understanding of the benefits and concerns of conversion. While the change from all-electric melting or electric boosting of glass tanks represent the loss of load, the production of oxygen is electricity intensive. For an electric utility, oxygen generation represents several megawatts of continuous load that does not fluctuate seasonally.

All-electric melting still has a place in modern glass melting operations, and the issue of acceptability needs to be revisited. Product quality, processing techniques, ease of operation, and the availability of energy and equipment have determined the selection of energy source options in the past. To some extent this continues today. However, each manufacturer's needs change over time and must be reevaluated in the light of current technology and other drivers.